ARTICLE **LETTER TO EDITORS**

How to Begin Your Research Journey, A Short Guide for the Medical Students in Jordan

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INTRODUCTION

Research has been advertised to be the ultimate goal of any medical student wishing to succeed after graduation. It has been said to be the door opener for many opportunities in different countries and in different disciplines. In actuality, yes, medical research is for a fact an extremely beneficial approach that all medical students should pursue. Conducting medical research and getting involved in all the steps of producing a scientific paper is not only a strong asset on the CV but also a very important learning experience for students. In Jordan, some medical schools have made it mandatory to study a medical research course and submit a research project before graduating medical school. In the US and the UK, medical research has even become a measuring tool for acceptance into residency programs. Today, there still remains a debate over whether this much focus on research is a positive or a negative for the medical community; however, there is no denying that it is now the reality for up and coming medical students around the world.

That is why medical students all around us want to step foot into the world of research. Yet, to many of them, the way around getting to this is quite puzzling. In many medical schools, no one really takes a student's hand and leads them to the path of medical research. One has to look and seek out opportunities on their own. This makes it especially hard to start early when a medical student is still not familiar with all aspects of medical studies and medical research. For this, our first advice for medical students pursuing this path is to familiarize oneself with research using whatever is at hand. Whether it is a university course, a paid workshop, an online article, or a youtube video, starting somewhere is always right. After a medical student has gained theoretical knowledge and some scientific skills, they are now able to take a step further into medical research.

Accordingly, in this article we will be discussing how a medical student can find the optimal pathway for conducting medical research. We chose to discuss the most important aspects regarding the research process for a beginner. These aspects are finding a research idea, collaborating with a suitable research team, and finding the supervision of a mentor. We will also provide information on the logistics and legal issues of conducting medical research and on the methods to publishing a finalized research paper.

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HOW TO DEVELOP A RESEARCH IDEA

HOW TO FIND AN IDEA - The research question must be defined as a major and critical step in the design of any research project. A well-defined research question will aid in the development of the experiment and ensure scientific relevance, even if the results are unexpected. On the other hand, a poorly formulated research question may eventually lead to an incorrect study design, prevent the creation of a clear protocol, impede the interpretation of study results, and adversely impact publication efforts.[1] As the first step in any clinical research project, the formulation of the research question necessitates a systematic approach that is easily forgotten.

The first step in developing a research question is choosing the topic that will be researched. While this may be easier for experienced researchers, beginner researchers frequently require assistance.[1] According to Law [2], the most common research questions arise from professional practice. The clinical practice offers to provide the public from which questions can be derived. These questions may arise because of observing a specific event or repetitive pattern, or they may arise because of curiosity about the relationship between different factors in a patient's environment.[3] The research idea, on the other hand, can come from a variety of other common sources.

Brainstorming with colleagues, the department chair, knowledgeable peers, and other researchers fosters the development of new ideas. Choosing and working with a mentor may also give the required experience in guiding the formulation of the study idea for new researchers. Interacting with the scientific community and exchanging information also opens up new possibilities for future project cooperation.

Following changes in the literature on the area of interest enables the identification of possible gaps. Medical literature frequently introduces new research issues. When there is disagreement over the results and conclusions of specific research, the investigator may desire to reproduce it to confirm the findings. Furthermore, the approaches employed by previous researchers to approach the issue may inspire fresh ideas and aid in determining which studies should be modified.[4] The discussion section after the conclusion of each article may provide give insights into topics that may be further investigated within the scope of the topic.

Along with examining current literature, it is always beneficial to keep an eye out for new technology and therapies. Practitioners may attend seminars and conferences to learn about new professional trends, explore innovative solutions, and re-evaluate their practice, identifying unproven hypotheses and unclear circumstances.

Funding possibilities can motivate the exploration of a certain research subject while also providing the required resources for project development. Funding announcements or requests for proposals may offer possibilities to establish and examine a specific field of knowledge, as well as to uncover new applications for research ideas.

HOW TO MAKE AN IDEA APPLICABLE - The success of a study project, on the other hand, is determined by how successfully investigators can transform a concept into a researchable question.[1]

Hulley and colleagues [5] proposed using the FINER criteria in the construction of an excellent research question. The FINER criteria emphasize important elements that may boost the likelihood of producing a successful research endeavor. A good research topic should describe the population of interest, be of interest to the scientific community and potentially to the public, be clinically relevant, and contribute to existing understanding of the subject (and of course be compliant with the standards of ethical boards and national research standards). Following the mnemonic, the research question must be (F) feasible, (I) interesting, (N) novel, (E) ethical, and (R) relevant. The feasibility of a good research question is critical. While many research topics can be generated in theoretically, only a small number of questions can be developed effectively. The investigator must select the appropriate balance between the concept and the resources required to solve the problem. The availability of financial resources, an acceptable number of subjects, and sufficient technical skill, as well as if the project is reasonable in terms of time and scope, are all factors to consider.

To complete the task successfully, the investigator must be really interested in what is being asked. Furthermore, it is important to ensure that the study topic is real and imagined in the interest of both the scientific and non-scientific communities. The researcher may save time and energy that might otherwise be spent on an uninteresting research issue by consulting peers, mentors, and coworkers.[1]

A study question's novelty is vital, and the best approach to identify originality is to conduct a thorough literature review. The investigator can determine the proper stage for evaluation and what has been done by studying the literature. PubMed, MedlinePlus, Web of Science, CINAHL, OVID, and the Cochrane Library are the most important research databases. A fresh research question, on the other hand, does not have to be wholly unique; it may confirm, contradict, or enlarge prior results. Prior studies with controversial results or mistaken methodology may represent a chance for modification and refinement because existing research questions can be approached in novel ways by employing a different population, distinct exclusion and inclusion criteria, different techniques, or different outcomes. Novelty may also be evaluated by speaking with specialists in the field about ongoing research and unpublished data, as well as examining internet resources. To get a full list of active clinical trials, investigators can use the NIH Computer Retrieval of Information on Scientific Projects (CRISP) Thesaurus or ClinicalTrials.GOV.

The aims and design of a study must adhere to ethical board and national research guidelines. As a result, while presenting a research query, the investigator must determine if the risk-benefit ratio offered by the inquiry is acceptable to the Institutional Review Board (IRB) for protocol approval. Investigators should be familiar with the major research ethics guidelines and codes, including the World Medical Association (WMA) Declaration of Helsinki [6], the ICH Harmonized Tripartite Guideline - Good Clinical Practice (ICH-GCP) [7], and the Council for International Organizations on Medical Guidelines (CIOMS) [8].

One of the most crucial components of a research topic is relevance; the perfect research question should advance clinical science. Furthermore, if the query can answer current questions or point to key missing features, the likelihood of gaining financial backing from funding institutions increases.[9] The researcher should ensure that the project has the potential to advance scientific understanding, influence clinical and health policy, or direct future research.

The PICO format is also a helpful format to use when developing a specific research question taking into account "the population (P) of interest, the intervention (I) being studied, the comparison (C) group (or to what is the intervention being compared), and the outcome of interest (O)" even though the FINER criteria outline the key aspects of the question in general. [10] Timing (T) is frequently appended to PICO — that is, "When will the study take place?" [11]. By referring to the exclusion and inclusion criteria and specifying the patient groups to be included, the PICOT approach creates a question that contributes to the development of the study's framework and, eventually, the design of the protocol. Knowing the population of interest, intervention (and comparator), and result of interest may also assist the researcher in identifying a suitable outcome assessment method. The more narrowly defined the population of interest, and therefore the harder the inclusion and exclusion criteria, the greater the impact on the interpretation and subsequent application and generalizability of the study findings.[5] A limited research population (and exclusion criteria) may reduce bias and boost internal validity; nevertheless, this method will limit external validity and, thus, the generalizability of the findings to the actual clinical situation. A widely specified study population and inclusion criteria, on the other hand, may be typical of actual practice but may raise bias and diminish the research's internal validity.

A badly designed research topic may influence the study design, perhaps leading to pointless circumstances, and therefore limiting the possibility of discovering anything of clinical relevance, which would subsequently reduce the potential for publication.[12] The quality of the study and subsequent results may be affected if adequate resources are not allocated to establishing the research topic. It is therefore critical to develop a research topic that is both clinically relevant and answered in the early phases of any research study.

HOW TO FIND A TEAM?

Different research tasks require a number of skilled individuals to implement them. A scientific research group consists of members who work closely together in order to accomplish specific assignments. It requires a combination of responsibility, leadership and vigorous communication [13]. With regards to growing an outstanding group, each affiliate should have a clearly defined role. Thus, when a team is run well, it would boost an individual's opportunities to present and publish their work [13]. For this, going on a quest to find the right research team is a vital part of your research journey.

Being part of a research team is essentially an interplay between networking and job hunting [14]. Networking and social media provides access to explore the opportunities and will surge the chances of finding a team to work in.

Meanwhile, the term "job hunting" is a more formal phrase representing the same meaning. The first step towards joining a group of researchers is determining what kind of team you want to be part of. This covers a variety of important aspects ranging from the number of members per group to the staff mix consisting of doctors and students[15]. Next, explore the different research groups and positions applicable within the corresponding department and those that best align with your research interest. In addition to that, building connections with people working in the field of medical research is another crucial facet[15]. Grasping a hint on what they do and whom they work with as well as learning from their experiences is one beneficial approach for joining a group.

Once the potential list of research groups are selected, schedule multiple meetings with the research advisors and members [14]. Get an insight on the expectations anticipated by this particular research group. If requirements are aligned, go ahead and take a step to notify the team on your interests to take a crucial part in the society.

Eventually, implications for research teams formed upon coordination and a positive team culture will result in a more efficient work and a potentially substantial amount of productivity [13]. Each and every team member should be able to contribute skills and expertise in order to provide a more fruitful, rewarding, and effective research experience.

HOW TO FIND A MENTOR?

Finding a research mentor Is extremely beneficial to your research learning journey, as it will save you much time that would be lost without actual progress. As a medical student, your research mentor will typically be a professor at the same school you attend. To determine the potential research mentors for you, you have to decide what research area interests you, then you want to discuss this with the research committee at your university or with a professor in one of your courses, they will help you find a faculty member who works in the same area you are interested in.

Another way to do this is by searching through the faculty members on the university webpage, they usually post their curriculum vita there which includes their publications and research interests, keep in mind that those could be outdated so we suggest using sites like PubMed to see their recent publications.

Once you find a potential mentor, you may contact him through email, phone or in persons. We suggest sending an email first to tell him that you are interested in his work, you should include your name, phone number, year of study (ex. Fourth year student), the area of research you are interested in and any past research experience. When you meet him in person you should discuss projects, your mentor may have their own ideas that you could work on with him or you may work on an idea of your own under his supervision.

The research mentor is an important key in your research learning journey, providing guidance, training and support, and serving as a role model for the trainee. The mentor should be an accomplished researcher with a sustained record of research publications and citations. You must ensure frequent interaction with the mentor as these interactions can be a rich learning moments. We recommend scheduling regular meetings with the mentor to monitor the progress toward your educational and research goals. You should be easy going and eager to learn so both you and the mentor could address obstacles to progress early and to work together to solve the problems one by one rather than just ignoring them. The faculty member will choose the enthusiastic and motivated students. You can show your enthusiasm through learning about his current research before contacting the professor.

You should know that the faculty member is trading away hours he could use to peruse his own career goals but instead he spends them on you. so You have to show the faculty member that you are going to help him get things done efficiently once you learn, be smart and hard working so he could trust the results.

ETHICAL-LEGAL ISSUES

Jordan was the first Arab country in the Middle East and North Africa (MENA) to implement clinical rules in 2001, providing the country with an acceptable scientific and ethical basis for clinical research, particularly in terms of conformity with good clinical practice (GCP) recommendations [16]. The majority of Jordanian public respondents understand the fundamental ethical considerations in clinical research, such as the requirement for informed permission and ethics approval [6].

Any research involving human subjects must comply with the guidelines outlined in the Helsinki Declaration. The Declaration of Geneva of the WMA binds the physician with the words, "The health of my patient will be my first consideration," and the International Code of Medical

Ethics declares that "A physician shall act in the patient's best interest when providing medical care." [17]

To ensure the adherence to the Helsinki Declaration, ethical implications of your study should be reviewed by the institution where you will conduct your research. The research protocol should be submitted to the institutional review board (IRB) or the ethical committee by the investigators (EC). In Jordan, there are 22 accredited and licensed research Ethics Committees (EC) based in university, private, and hospital settings. [6]

Furthermore, after the ethics committee approves your study, you will be given a unique identity code along with the registration date. This registration safeguards your intellectual property rights. It is inappropriate for another member of your institution to register the same protocol without your consent. [18]

Although the basic ethical principles of clinical research are universal, various institutions and nations have their own rules at the local and national levels. It is the researcher's obligation to follow national and local rules when doing their research.

Ethics committees, for example, differ in their informed consent format, protocol template, types of research that are authorized at the institution, validity period of approvals, and protocol change and renewal terms.

For a general scheme that should be followed after completing the study protocol, if the study is planned to be carried out in local institutional environment, an IRB should be taken from your medical school EC or from the authorized institutional EC. However, if the study is decided to be a regional, national, or international design it should be carried under the umbrella of the Ministry of health EC. The steps vary according to your position, the study should firstly be approved by your institution EC then a full letter including the study members Curium valete, the study protocol, the funding statement and an Arabic/ English title page should be carried out to the EC office of the MOH. The IRB usually takes around a month to be completed.

An Important note that should be mentioned is that there are many institutes need a specialized IRB form even after the completion of the MOH IRB. These include for instances the Royal Medical Services RMS health institutions, Jordan University Hospital JHU, King Abdullah University Hospital KAUH, Prince Hamza Hospital and some other private sector hospitals.

FUNDING ISSUES

The process of filing grants and obtaining research funding is an important aspect of furthering one's career for all academic biomedical researchers. With fewer new grant grants and renewals, and much lower success rates, it is difficult for young aspiring physician-scientists to stay hopeful about their future in academic medicine [19].

There are many national/international funding programs that can be helpful to maintain a successful economic planning for the research project, however because grant preparation takes a significant amount of time, including preliminary studies, identifying available resources, assembling a reliable research team, and writing a proposal, it is prudent for early investigators to design a project that can be widely applied to meet the needs of various grant agencies. This allows the investigator to explore numerous prospective funding sources at the same time, while also forcing them to closely analyze how the chosen research subject might be expanded or updated to suit additional populations or areas of study interest [20,21].

JOURNAL SELECTION

Before you begin writing, consider your intended diary. The structure of your work in general, and the introduction and discussion sections in particular, will be influenced by the nature of the target journal. Discuss the focus and targeted audience for this specific paper with your team to determine whether the target journal is generalist or specialist. Examine the relevant literature for your project to discover whether any comparable work has been published. Examine the journals' websites and author instructions to see whether a journal publishes the type of paper you intend to write, such as whether the publication accepts basic or clinical research.

Points below are important to consider when you select a certain journal:

JOURNAL BUSINESS MODEL - This includes, among other items, the journal's publisher, its goals and objectives, and its mission statement. The quality of a journal can be strongly supported by the publisher. The goal and scope should be made clear, and additional information like a mission statement or sponsoring organizations can be used to judge the journal's reputation. The business model of a journal should be clear, and there shouldn't be any unexpected costs after a manuscript is submitted for peer review. If there are costs associated with publication, these costs

should be made explicit on the journal website.

INDEXING STATUS - Authors want readers to be able to access and find their work. Instead of relying solely on the journal website, it is advised for authors to check the indexing status of a journal using a bibliographic and citation database. Major bibliographic and citation databases like MEDLINE, Elsevier Scopus and EMBASE, and Clarivate Analytics Web of Science will index high-quality journals.

IMPACT FACTOR - The average number of citations of papers published in a journal over the previous two years is shown by the journal's impact factor. It is frequently used to judge how well-known a journal is. Consider impact factors, but do not be misled by them. Although the higher a journal's impact factor, the better it is, it is advised to balance your preference to publish in such journals with your preferred timing of publication because they take longer time and may extend for many months due to the necessity of multiple submissions the process of revision.

SUBMITTING A PAPER

Read your entire manuscript again from beginning to end to ensure that you have met all of the journal's unique author requirements. Write a persuasive cover letter stressing the value of the study for the field of research and its relevance to the specific journal, taking the following aspects into account:

1. The title of your paper and your request to submit it for publication.
2. The importance of the primary findings in the field.
3. Relevance to the journal's readership
4. Journal-required information and other issues linked to the paper
5. Comply with the processes outlined in the journal's online submission system.
6. Archive all pertinent submission data.
7. Monitor the journal's processing of your work from time to time.

THE ARTICLE REVIEW PROCESS

Each paper is initially examined internally by the editors; those of adequate quality are then sent to 3-4 external referees. This method differs every journal and provides the basis for deciding whether to accept the article pending revision or reject it. In either case, the corresponding author receives the remarks from the referees and the editor following external review. When a revision is required, editors recommend that the amended manuscript be sent within a few weeks so that the article can be published on time.

RESPONSE TO THE REVIEWER

Acceptance, rejection (directly by the journal's editor or after peer review), or revision are the three types of editorial decisions made about submitted manuscripts (usually with peer review) Receiving a "revise and resubmit" decision indicates that a journal is interested, which is good news because it indicates that your manuscript has a good possibility of acceptance if you answer properly to the reviewers' recommendations.

Be mindful that articles are frequently rejected rather than accepted. Reviewer reviews will provide you with free suggestions on how to improve your article. After receiving the decision, read it, sleep on it, and then read it again, pondering on the reasons for rejection. Share the rejection decision with your coauthors and take use of the opportunity to strengthen your paper before submitting it to another magazine. Do not wait too long and encourage yourself to begin the next submission as soon as feasible. Be just as cautious with a new submission of your paper as you were with the first. Always be courteous to the reviewers when responding to their comments.

CONCLUSION

In conclusion, this article has discussed the vital facets of the research process for a medical student and has provided a direct and clear explanation on the main issues that could face a beginner. Certain aspects should be kept in consideration when starting a research journey. Finding the right idea with the supportive team and mentor is a must for better results in this experience. Extensive knowledge and skills are also a requirement for progress in research, and fortunately, resources are widely available over the internet and other outlets. Evidently, the research process for a beginner could be a tortuous path. Nonetheless, when medical students try to follow the tried and successful tract, medical research will definitely become much more accessible to them.

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